

Coordinated Mobilization Matters: How Did Taiwan Do It During the Covid-19 Pandemic?

Chun-Yuan Wang*, Elaine Yi Lu†, Yan-Yi Chang^, Alex L. Huang§

* Central Police University, Taiwan; † City University of New York - John Jay College, USA;

^ Chung Hua University, Taiwan; § Team Terra, USA

The Covid-19 pandemic hit the world hard. Ensnared by a large-scale emergency unprecedented in recent history, mobilization, the classic issue of emergency management, is under stress and test. Yet Taiwan stands out in its rather limited cases of infections despite its frequent contact with mainland China and high population density. Could its mobilization have made the difference? This article traces the steps and strategies that Taiwan took to implement a coordinated mobilization. Three strategies were highlighted: awareness mobilization by declaring emergency early on, resource mobilization by preemptively controlling, boldly incentivizing and surgically distributing resources, and agility mobilization via big data and technology to optimize the response system.

INTRODUCTION

Viruses do not respect borders. Coronavirus rapidly caused a global pandemic. As of late April 2020, more than 2.9 million cases have been confirmed worldwide, and more than 206,000 people have died (Johns Hopkins Coronavirus Resource Center, 2020). Regions with large populations around the world are the primary victims of this pandemic. For instance, New York State (NYS), 8000 miles away from mainland China, is the current epicenter of the Covid-19 crisis. As of April 26, 2020, the New York Times reported 288,076 cases and 16,966 deaths in New York State (New York Times 2020). On the other hand, Taiwan, about 100 miles off the coast of mainland China, confirmed 429 cases as of April 30, 2020, including 6 deaths (Ministry of Health and Welfare 2020). Despite their similar populations, New York State has about 720 times the confirmed cases of Taiwan. Although New York State (primarily due to New York City) is one of the most interconnected states in the world, Taiwan is also well connected with the world, frequently interacting particularly with mainland China in various fields such as transportation and commercial trade. Since Taiwan and New York State were alerted to the virus situation in China around the same time, the question is: how are the

results so different? Our opinion is that coordinated mobilization saves lives. Given the ongoing nature of this pandemic, this viewpoint article intends to make a preliminary analysis from the perspective of crisis management, focusing on how the mobilization actions taken, both proactively and reactively, played an important role in their trajectories. While there is no dispute about the importance of mobilization in crisis management, how to get it done is far from understood. In this study, we primarily describe the mobilization efforts in Taiwan and briefly contrast them with those of New York State to aid the discussion. The purpose is to explore how Taiwan coordinated mobilizations during the early stage of the Covid-19 pandemic that made a difference in its trajectory in Taiwan.

MOBILIZATION IN EMERGENCY MANAGEMENT

Mobilization refers to “being able to effectively gather a lot of manpower in a short time (investing in disaster relief)” and “the immediate investment of resource” (Yang, 2009, p. 151). In the event of a crisis, mobilization of a collective community response system to reduce risks and respond to dangers has become an important key to sustainable and effective crisis management (Comfort, 2007). A study by Elsubbaugh *et al.*

(2004) showed that as high as 81% of their senior managers consider resource mobilization important in crisis preparation activities, a point confirmed by Col (2007, p. 121). Taking the 921 earthquakes in Taiwan as an example, Yang (2010) pointed out that local governments mobilized huge disaster relief resources and donations through the media, which demonstrated the influence of mobilization ability in disaster management. As Smart and Vertinsky (1977, p. 654) concisely pointed out, “a special emergency communications network and other organizational resource reserves should be established, emphasizing rapid mobilization.”

Yet implementing a mobilization process is challenging. For example, Ansell *et al.* (2010, p. 199) stated “mobilization in itself is not enough. The efforts of all these organizations, and all the people within these organizations, must be coordinated to ensure an effective response. The challenge is thus one of ‘coordinated mobilization.’” In this coronavirus pandemic, we are interested in exploring: how could coordinated mobilization be done effectively?

CONTEXT: CHALLENGES AND STRENGTHS FOR TAIWAN IN MANAGING THE PANDEMIC

To understand what Taiwan implemented to manage the pandemic, it is important to understand the context. New York State’s information is also provided as a reference point to aid the understanding of context. In general, Taiwan faced many challenges for pandemic control. As we mentioned before, Taiwan is much closer to and maintains high-frequency travel connections with mainland China than New York State. Also, Taiwan only has about a third of the economic capacity of NYS, with a GDP per capita of just under \$26,000 (\$609 billion of GDP in total in 2018),¹ compared to about \$76,627 in 2019 in NYS (1.49 trillion in total) (Blokhin, 2020). Furthermore, Taiwan’s population density is higher than that of NYS: about 650 people per square mile in Taiwan² versus about 400 people per square mile in NYS (New York State, 2016), which would have created a perfect situation for viruses to spread in Taiwan.

Taiwan, however, is not a novice in emergency management. Geographically, it is an area prone to typhoons and earthquakes, among other natural disasters. For instance, according to a news report by Focus Taiwan (CAN, 2019), “on average, Taiwan has 2-3 earthquakes with a 6.0-7.0 magnitude and 22 with a 5.0-6.0 magnitude each year,” which is about 2% of all earthquake occurrences in the world. Particularly, Taiwan’s exposure to the Severe Acute Respiratory Syndrome (SARS) in 2003 has also provided Taiwan with relevant lessons in dealing with public health crises. We also expect that Taiwan’s culture consisting of Buddhism, Confucianism, and Taoism is instrumental in seeking citizen compliance with regulatory mandates, which could be very helpful in containing a virus. Nevertheless, all these experiences and cultural factors need to work in sync. How did Taiwan pull them together? Our preliminary analysis seems to suggest the role of coordinated mobilization. We analyze this issue from three aspects.

COORDINATED MOBILIZATION: HOW DID TAIWAN DO IT?

Both Taiwan and NYS have legal foundations for resource mobilization and operation mechanisms for crises. The role of these guidelines is to enable the coordination and mobilization needed in any crisis. The difference lies in how these legal foundations are implemented to coordinate mobilizations. Three actions stand out in Taiwan’s case.

First, awareness mobilization by declaring an emergency early on. The main prerequisite for improving crisis management capacity is the awareness of potential crises (Tanifuji, 2000). Therefore, the first step in crisis management is to realize the existence of the risk (Koller, 2007) which requires mental mobilization as a necessity to combat danger (Dyregrov *et al.*, 2000). On the first day of

¹ National Statistics. (2018). <http://statdb.dgbas.gov.tw/pxweb/Dialog/NI.asp?mp=4>

² “Ministry of Interior”. Monthly Bulletin of Interior Statistics. <https://ws.moi.gov.tw/001/Upload/400/refile/0/4413/d1d7bfc0-d03a-4cb6-bac2-06353bc6d082/month/month.html>

Table 1. Case Progression in Taiwan and New York State

Date	Taiwan		New York State	
Dec 31, 2019	China informed WHO of coronavirus cases			
Jan 20, 2020	Taiwan declared Level 2 Emergency			
Jan 21, 2020	Taiwan first confirmed case		Changing rate of COD emissions during the tenure	
Jan 31, 2020	Total cases	10	Total cases	0
	Cases per 1 M population	0.42	Cases per 1 M population	0
Feb 29, 2020	Total cases	39	Total cases	0
	Cases per 1 M population	1.65	Cases per 1 M population	0
Mar 1, 2020	NYS first confirmed case (US first case reported on Jan 21 by CDC)			
Mar 7, 2020	Governor declared emergency			
Mar 31, 2020	Total cases	322	Total cases	75,800
	Cases per 1 M population	13.64	Cases per 1 M population	3,790
Apr 30, 2020	Total cases	429	Total cases	304,400
	Cases per 1 M population	18.18	Cases per 1 M population	15,220

Note: 1. Data of Taiwan come from Taiwan Centers for Disease Control (CDC, Taiwan), https://covid-19.nchc.org.tw/dt_005-covidTable_taiwan.php. The population of Taiwan at the end of April, 2020, is approximately 23.6 million. 2. Data of New York State come from Johns Hopkins's COVID-19 data, publicly available at <https://coronavirus.jhu.edu/us-map>.

knowing about the virus outbreak in mainland China, Taiwan wasted no time elevating awareness among government officials via timely high-level meetings. In the morning council meeting of Executive Yuan on December 31, 2019, the “Vice Premier” (who has a Master’s degree in Public Health) reported that China had informed the WHO (World Health Organization) that in Wuhan, China there were 27 unexplained cases of pneumonia, with 7 critically ill. The “Premier of Executive” Yuan immediately convened an inter-ministerial meeting. The meeting quickly concluded that to prevent cases from multiplying, the relevant agencies must:

- 1) Initiate a border quarantine response strategy
- 2) Strengthen inbound passengers’ fever screening
- 3) Carry out inquiries on travel and contact tracing
- 4) Conduct check-in quarantine for flights originating from Wuhan, Mainland China
- 5) Promote preventive measures to the passengers on these flights (“Central News Agency”, 2020)

Then, how to mobilize the minds of citizens became a key issue. We argue that one of the best ways to raise public awareness of an emergency is to declare one. In Taiwan’s case, one day *before* the first confirmed case of Covid-19 appeared on January 21, its Central Epidemic Command Center (CECC) declared a Level 2 emergency on Jan 20. As the epidemic situation in mainland China expanded, Executive Yuan announced on February 27 that the CECC declaration had been upgraded to Level 1. Executive Yuan stated that the upgrade to Level 1 was not due to the start of community infections. Instead, it is meant to help the “advanced deployment” of resources and coordination capacity. After the establishment of a Level 1 emergency, the commander has more authority to communicate horizontally across ministries. At the same time, local governments such as the Taipei City Government also upgraded their Epidemic Command Center along with Taiwan government (Executive

Yuan, 2020). During the first three months of the pandemic, the “advanced deployment” of resources and coordination capacity sent clear messages to citizens in terms of crisis awareness and preparation, and have become a core concept of Taiwan’s pandemic prevention and mitigation. While Taiwan declared an emergency one day before their first confirmed case, New York State did not declare an emergency until March 7th, when 89 Covid-19 cases have already been confirmed in NYS (New York Times, 2020). Table 1, a comparison of case progression between Taiwan and NYS, clearly indicates that the early declaration of emergency and early actions in Taiwan seemed to prevent massive increases in confirmed cases.

Second, resource mobilization by preemptively controlling, boldly incentivizing, and surgically distributing resources. Facing the Covid-19 crisis, Taiwan treats pandemic prevention as combat where, as a widespread slogan indicated, “our common enemy is the virus.” The ancient Chinese saying “before the army is moving, the grain and grass should move first” emphasizes the idea of resource preparation for pandemic prevention. Although the voluntary participation of the people in mobilization is indispensable, the lesson is clear: governments need to bear the greatest responsibility of resource mobilization (Comfort, 2007; Nohrstedt, 2016; Yang, 2009, 2010).

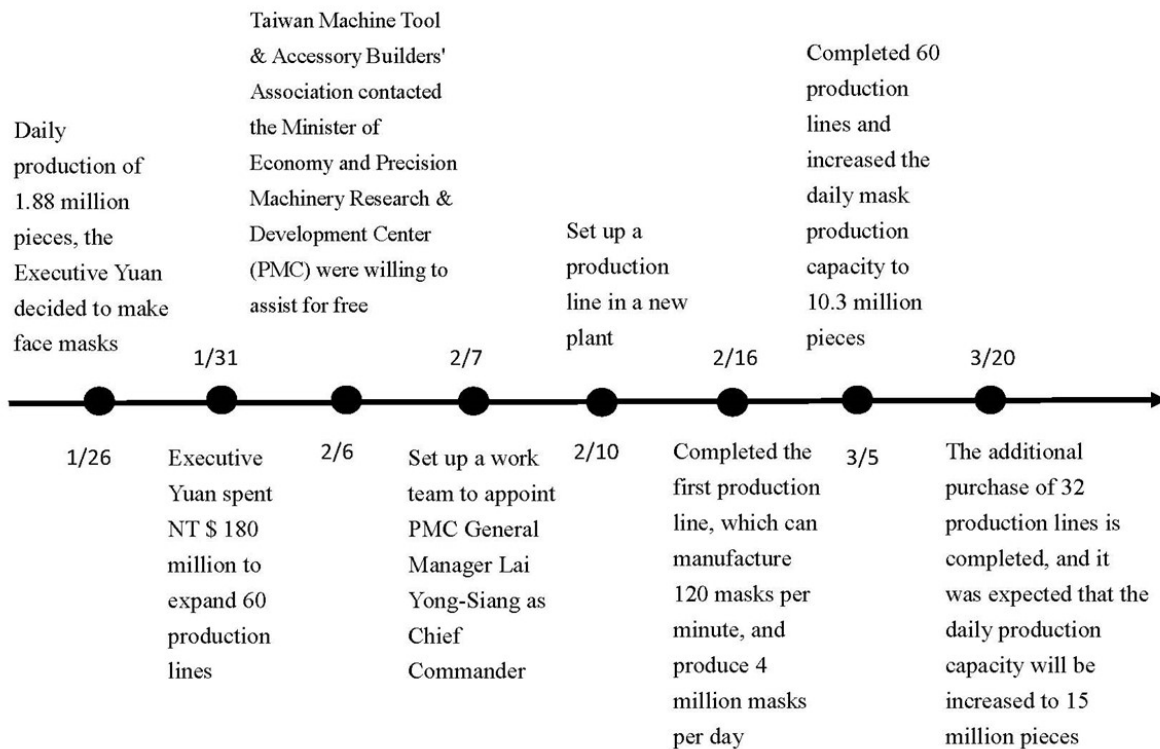
A case in point is how Taiwan coordinated and mobilized the resources to provide masks. While many countries experience a severe shortage of essential protective gear, the surgical mask policy of Taiwan’s pandemic prevention is an example of success. A couple of lessons can be learned.

- **Preemptively controlling.** When the coronavirus pandemic broke out, Taiwan’s “Ministry of Economic Affairs” announced on January 24 that it would suspend the export of masks and give priority to supplying Taiwan’s domestic demand. About a week later on January 31, the “Ministry” announced the requisition of all mask factories, as well as unified management of mask distribution and production. The US did the opposite. According to USA Today

(Zhang *et al.*, 2020), “U.S. exports of masks to China this February surged to \$15.8 million, their highest February levels in a decade.”

- **Boldly incentivizing.** At the end of January, the “Ministry of Economic Affairs” in Taiwan planned to cooperate with private manufacturers to build a surgical mask-producing team. At that time, Taiwan’s daily mask production capacity was only 1.88 million, making it difficult to meet the needs of 23 million people in Taiwan. The world was also in dire shortage of masks, so purchasing masks was not possible. Taiwan made a bold move to purchase mask production lines at NT \$3 million each (about US \$100,000). Another bold move to incentivize the production of masks was the creation of a unique program called the “Conditional Gift Project.” Under the Project, a production line is free for a manufacturer to keep if the manufacturer meets certain conditions. That is, each production line must produce a total of at least 5 million surgical masks, of which 1.2 million units are directly delivered to the government free of charge to offset the production line cost that the government prepaid, while the government buys from the manufacturers the remaining 3.8 million masks at a prevailing market price of NT \$2.5 each. None of these mask machines can be exported. The Taiwanese government purchased and dispersed 60 production lines to 15 mask factories in Taiwan, and then quickly increased its production capacity. Although these tool machinery manufacturers initially contacted the Ministry of Economic Affairs to express their willingness to provide “gratuitous” assistance, the “Conditional Gift Project” incentivized the manufacturers to produce masks as quickly as possible, a win-win situation for the government, manufacturers and the people. (Chiu, 2020; Wang, 2020). The “Conditional Gift Project” was gradually scaled up according to perceived risk level. Within 40 days, the project went from adding 32 production lines at the end of February to the installation of 92 production lines by March 20. Within less than two months, the production capacity increased to 15 million pieces, which is nearly 8 times higher than at the end of January (Wang, 2020). Figure 1 presents the schedule of the Taiwan surgical mask team.

Figure 1. Time Schedule of Surgical Mask Team in Taiwan



Source: Wang (2020), accessed on April 18, 2020.

• **Surgically distributing.** Controlling resources and incentivizing production will not be helpful to combat crisis if the resources are not distributed to people in need in time. One common issue with essential resources during any crisis is hoarding and price hiking. Taiwan combats this common issue by surgically distributing them. Taiwan launched a real-name system from the very beginning, requiring IDs to purchase masks. Under the real-name mask system 1.0 that started on February 6, citizens with odd/even ID numbers can purchase two masks once a week on odd/ even days at National Health Insurance (NHI)-appointed pharmacies (“Ministry of Health and Welfare”, 2020). This real-name rationing strategy effectively prevents hoarding and the rush to purchase while maintaining an equal distribution of authentic masks from reputable sources. Under the real-name mask system 2.0 that started on March 12, the increase in mask production capacity allowed the public to buy nine masks every 14 days (“Ministry of Health and Welfare”, 2020). Also, there was a wide range

of digital channels to purchase and distribute masks. Citizens can pre-order masks online or on the National Health Insurance app (My Health Bank) on a mobile phone and choose a credit card, online banking, or a physical ATM transfer to pay and pick up from a wide range of locations including supermarkets. The convenience of distribution is greatly improved. The real-name mask system 3.0 that began on April 22 further simplifies the process by adding the option of a one-stop transaction where citizens can pre-order, pay, and pick masks up at the same supermarket (“Central News Agency”, 2020). Table 2 shows the comparisons among the three systems.

In contrast to Taiwan’s emphasis on preventive measures from day one, many governments in the early stage of the virus spread, including New York State government, did not urge people to wear masks. However, with the help of research, governments of various countries have realized that masks are effective in preventing respiratory viruses (Feng *et al.*,

Table 2. Comparison of Surgical Face Mask Real-name Purchasing Systems

Generations of Real Name Mask Purchasing Systems	Pre-order System	Payment	Pick up Method
1.0 Physical Health Channels	Pharmacy, Public Health Center, Health Center	Cash	Pick Up on Site at National Health Insurance (NHI)-appointed pharmacies
2.0 Digital Order Channels	e-Mask, Mask Pre-Order System, My Health Bank app	ATM Transfer, Credit Card	Convenience Stores, Px Mart, Simple Mart
3.0 One Stop Convenience Stores Channels	National Health Insurance Card	Convenience Stores Payment	Convenience Stores

Source: National Health Insurance Administration (2020), accessed on April 22, 2020.

2020). Not until April 15, 2020 did the New York State governor order the residents to wear masks in public when social distancing is not possible (New York State, 2020). Despite most people in NYS not wearing masks before the governor’s order, the severe shortage of protective gear in NYS, particularly among medical professionals, is laid bare.

Third, agility mobilization via big data and technology to optimize the response system. Given the contagious nature of the disease, a critical question is: how can you identify possible cases before they are confirmed? The key is information sharing (Gil-Garcia *et al.*, 2019). One example is that the citizens’ entry and exit information in Taiwan, maintained by the “National Immigration Agency” in the “Ministry of the Interior,” is effectively integrated with the health information on insurance cards maintained by the Ministry of Health and Welfare. When people use their insurance cards, hospitals or clinics know their recent travel history, allowing doctors and nurses to deal with people with various risks in a better-prepared manner (Wang, 2020). Another example is that when the mask system was first launched, the public needed to go to pharmacies to buy masks with their insurance cards. However, the number of remaining masks in each pharmacy was not immediately known to citizens. Therefore, the government worked with the private sector to develop a mask map app for the public. Big data and technology that links information between government agencies or public-private connections plays an important role in optimizing the response

system (Central News Agency, 2020).

CONCLUSION

Emergency shock is unpredictable and chaotic (Lindell *et al.*, 2007). This preliminary analysis suggests that coordinated mobilization is key. According to Ansell *et al.* (2010, p. 199), coordination challenges become particularly acute in transboundary crises, such as the Covid-19 pandemic. Our mini-comparison between NYS and Taiwan indicates what governments do proactively and reactively with coordinated mobilization matters more to emergency management outcome than the sheer size of resources or the less favorable conditions. As illustrated in the viewpoint, through enabling legislation, mobilizations need to be coordinated to achieve desirable emergency management outcomes.

Although Taiwan’s experience and its Covid-19 mitigation outcome are impressive, we understand that the different cultures and governing systems require different solutions. It is indisputable that from the perspective of crisis governance, there are still many challenges in Taiwan’s pandemic prevention. For example, after the Navy Panshi Fast Combat Ship returned to Taiwan after its mission, there were four incidents of negligence where almost 30 confirmed officers and soldiers vacationed in more than 10 counties and cities across Taiwan, many of which may have caused community infections. In a systemic crisis where the end is unknown, achieving temporary

results may loosen the vigilance of some government officials and the public. How to sustain vigilance in the post-mobilization phase also warrants further study.

ACKNOWLEDGEMENTS

The authors would like to thank Ms. Claire Fleischer for her research assistance on this project.

REFERENCES

- Ansell, C., Boin, A., & Keller, A. (2010). Managing transboundary crises: Identifying the building blocks of an effective response system. *Journal of Contingencies and Crisis Management*, 18(4), 195-207.
- Blokhin, A. (2020). 5 states with the highest real GDP per capita. Investopedia. Accessed 24 February 2021. <https://www.investopedia.com/articles/investing/112415/5-states-highest-gdp-capita.asp>
- “Central News Agency” (CNA). (2020). Chen, Mei-Ling: Open data to check mask map easily. Accessed 4 February 2020. <https://www.cna.com.tw/news/afe/202002260399.aspx> (in Chinese)
- “Central News Agency” (CNA). (2020). The mask real-name system 3.0 will be launched on the road, and the pre-order in superstore recognizes card but not people. Accessed 21 April 2020. <https://www.cna.com.tw/news/firstnews/202004210337.aspx> (in Chinese)
- “Central News Agency” (CAN). (2020). Goodwill (Dunmu) fleet infected by the Ministry of National Defense: There are 4 major deficiencies such as notifications not implemented. Accessed 21 April 2020. <https://www.cna.com.tw/news/firstnews/202004210384.aspx> (in Chinese)
- “Central News Agency” (CNA). (2020). Taiwan has seen high number of strong earthquakes this year: CWB. Accessed 3 April 2019. <https://focustaiwan.tw/society/201904030024>
- Col, J. M. (2007). Managing disasters: The role of local government. *Public Administrative Review*, 67(S1), 114-124.
- Comfort, L. K. (2007). Crisis management in hindsight: Cognition, communication, coordination, and control. *Public Administration Review*, 67(S1), 189-197.
- Dyregrov, A., Solomon, R., & Bassoe, C. F. (2000). Mental mobilization processes in critical incident stress situations. *International Journal of Emergency Mental Health*, 2(2), 73-82.
- Elsubbaugh, S., Fildes, R., & Rose, M. B. (2004). Preparation for crisis management: A proposed model and empirical evidence. *Journal of Contingencies and Crisis Management*, 12(3), 112-127.
- Executive Yuan. (2020). Premier urges renewed vigilance for 3rd wave of COVID-19 fight. Accessed 9 April 2020. <https://english.ey.gov.tw/Page/61BF20C3E89B856/570fa66e-0258-4d6e-84e7-a389efe07534> (in Chinese)
- Executive Yuan. (2020). Central epidemic command center raised to level-1 facility. Accessed 9 April 2020. <https://english.ey.gov.tw/Page/61BF20C3E89B856/de8adc4f-d276-42cd-a7c9-cd4d551d6a7d> (in Chinese)
- Feng, S., Shen, C., Xia, N., Song, W., Fan, M., & Cowling, B. J. (2020). Rational use of face masks in the COVID-19 pandemic. *The Lancet Respiratory Medicine*, 8, 434-436.
- Gil-Garcia, J. R., Guler, A., Pardo, T. A., & Burke, G. B. (2019). Characterizing the importance of clarity of roles and responsibilities in government inter-organizational collaboration and information sharing initiatives. *Government Information Quarterly*, 36(4), 1-7.
- Johns Hopkins Coronavirus Resource Center. (2020). COVID-19 dashboard by the center for systems science and engineering (CSSE) at Johns Hopkins University (JHU). Accessed 26 April 2020. <https://coronavirus.jhu.edu/map.html>
- Lindell, M. K., Prater, C. S., and Perry, R. W. (2007). *Introduction to emergency management*. NJ: John Wiley & Sons, Inc.
- Koller, G. R. (2007). *Modern Corporate Risk Management*. Ft. Lauderdale, FL: J. Ross.
- “Ministry of Health and Welfare” (MOHW). (2020). The “real-name mask system” is on the road today, and professional medical personnel serve the people. Accessed 18 April 2020. <https://www.mohw.gov.tw/cp-4635-51376-1.html> (in Chinese)
- “Ministry of Health and Welfare” (MOHW). (2020).

- “Mask real name system 2.0” online shopping will start trial operation tomorrow, and it is very convenient for supermarkets to pick up goods. Accessed 18 April 2020. <https://www.mohw.gov.tw/cp-4634-51912-1.html> (in Chinese)
- “Ministry of Health and Welfare”. (2020). Latest epidemic information. Accessed 30 April 2020. <https://topics.mohw.gov.tw/COVID19/cp-4707-52357-205.html> (in Chinese)
- National Health Insurance Administration. (2020). The comparison of mask real-name systems. Accessed 22 April 2020. <https://www.facebook.com/nhi.gov.tw/> (in Chinese)
- New York State. (2020). Amid ongoing COVID-19 pandemic, Governor Cuomo issues executive order requiring all people in New York to wear masks or face coverings in public. Accessed 24 February 2021. <https://www.governor.ny.gov/news/amid-ongoing-covid-19-pandemic-governor-cuomo-issues-executive-order-requiring-all-people-new-york>
- New York State. (2020). No. 202: declaring a disaster emergency in the state of New York. Accessed 26 April 2020. <https://www.governor.ny.gov/news/no-202-declaring-disaster-emergency-state-new-york>
- New York State. (2016). Table 2: Population, land area, and population density by county, New York State - 2015. Accessed 24 February 2021. https://www.health.ny.gov/statistics/vital_statistics/2015/table02.htm
- New York Times. (2020). New York coronavirus map and case count. Accessed 26 April 2020. <https://www.nytimes.com/interactive/2020/us/new-york-coronavirus-cases.html#map>
- New York Times. (2020). Coronavirus in N.Y.: Cuomo declares state of emergency. Accessed 7 March 2020. <https://www.nytimes.com/2020/03/07/nyregion/coronavirus-new-york-queens.html?searchResultPosition=1>
- Nohrstedt, D. (2016). Explaining mobilization and performance of collaborations in routine emergency management. *Administration & Society*, 48(2), 135-162.
- Smart, C., & Vertinsky, I. (1977). Designs for crisis decision units. *Administrative Science Quarterly*, 22(4), 640-657.
- Tanifuji, E. (2000). Crisis awareness and organizational response capabilities in present Japanese local governments: Crisis awareness survey findings. *Journal of Contingencies and Crisis Management*, 8(1), 30-41.
- Wang, Y. L. (2020). 20 countries ask Taiwan for Help! the national team of the mask built 92 production lines in 40 days, and the experience of building factories was exported to Europe and America. Accessed 18 April 2020. <https://www.bnnext.com.tw/article/57318/mask-taiwan-team-package-plant-export> (in Chinese)
- Yang, Y. N. (2009). Research on disaster rescue system: The 88 flood case in Taiwan. *Journal of Public Administration*, 32, 143-169. (in Chinese)
- Yang, Y. N. (2010). Disaster rescuing system of local government: The 921 earthquake in Taiwan. *Disasters*, 34(1), 112-136.
- Zhang, D., Mansfield, E., & Voyles Pulver, D. (2020). The US needs masks to fight coronavirus, but supplies from China fell as demand rose. USA Today. Accessed 26 April 2020. <https://www.usatoday.com/story/news/investigations/2020/04/08/coronavirus-how-face-mask-supply-u-s-dropped/5119824002/>

ABOUT THE AUTHORS

Chun-Yuan Wang is a professor at the Department of Police Administration, Central Police University, Taiwan. E-mail: g885422@seed.net.tw. His primary research area is emergency management.

Elaine Yi Lu is a professor and director at the Department of Public Management of John Jay College of Criminal Justice at The City University of New York. E-mail: ylu@jjay.cuny.edu. She is also the corresponding author. Her primary research area is government performance.

Yan-Yi Chang is an associate professor at the Department of Public Administration, Chung Hua University, Taiwan. E-mail: cyy@chu.edu.tw. His primary research area is emergency management.

Alex L. Huang is a co-founder of Team Terra. Email: huangalex360@gmail.com. His primary research interests are the use of technology in emergency

management, sustainability and resilience.